

EXHIBIT 1

TO

**Professor Ran
Libeskind-Hadas**

DECLARATION

CURRICULUM VITAE

Ran Libeskind-Hadas

Department of Computer Science
Harvey Mudd College
1250 N. Dartmouth Ave.
Claremont, CA 91711

Office phone: (909) 621-8976
Home phone: (909) 625-6162
E-mail: hadas@cs.hmc.edu
URL: www.cs.hmc.edu/~hadas

EDUCATION

- Ph.D.** Computer Science, University of Illinois at Urbana-Champaign, 1993
Ph.D. thesis (under C. L. Liu): *Reconfiguration of Fault Tolerant VLSI Systems*
- M.S.** Computer Science, University of Illinois at Urbana-Champaign, 1989
M.S. thesis (under C. L. Liu): *Neural Network Solutions to Two VLSI Design Problems*
- B.A.** Applied Mathematics, *magna cum laude*, Harvard University, 1987
Undergraduate thesis (under Petros Maragos): *An Application of Iterated Function Systems and Skeletonization to the Modeling of Fractal Images*

RESEARCH INTERESTS

Routing algorithms for optical networks
Collective communication in parallel computers and networks of workstations
Computational Biology

AWARDS

- Joseph B. Platt Endowed Chair, Harvey Mudd College 2005-2010
Endowed five-year faculty chair for effective teaching
- Iris and Howard Critchell Assistant Professorship, Harvey Mudd College, 1996-1999
Endowed junior faculty chair for teaching and mentoring
- C. William Gear Outstanding Graduate Student Award, Inaugural Award, 1991
"Awarded annually to a graduate student in the Department of Computer Science at the University of Illinois at Urbana-Champaign on the basis of demonstrated excellence in research and service"
- GTE Graduate Fellowship, 1987-1993

ACADEMIC POSITIONS

Acting Department Chair, Department of Computer Science, Harvey Mudd College, July 2006-July 2007

Professor, Department of Computer Science, Harvey Mudd College, July 2003-present

Associate Professor, Department of Computer Science, Harvey Mudd College, July 1999-July 2003

Assistant Professor, Department of Computer Science, Harvey Mudd College, May 1994-July 1999

Assistant Professor, Department of Mathematics, Harvey Mudd College, August 1993-May 1994

VISITING AND ADJUNCT POSITIONS

Visiting Scholar, School of Information Technology, University of Sydney, Australia, August 2007 – July 2008

Member of the Faculty, Doctoral Program in Computational Science, San Diego State University/Claremont Graduate University, 2001 – present

Visiting Researcher, Department of Computer Science, Department of Computer Science, University of Pittsburgh, March – August 2000

Visiting Scientist, Department of Computer Science, Technion - Israel Institute of Technology, August 1999 – March 2000

Visiting Lecturer, Department of Computer Science, University of Illinois at Urbana-Champaign, Summer 1992 and Summer 1993

GRANTS

REU Site: Harvey Mudd REU Site on Artificial Intelligence, Systems, and Optical Networking

National Science Foundation Research Experience for Undergraduates (REU) Grant
Directorate for Computer and Information Science and Engineering
May 2005 - April 2008
\$286,209

Virtual Topologies for Multicast Communication in WDM Networks

National Science Foundation RUI Grant
Advanced Networking Infrastructure and Research (ANIR) Directorate
June 2002 - May 2005
\$170,500

Efficient Collective Communication in Switch-Based Networks of Workstations

National Science Foundation RUI Grant

Computer-Communications Research (CCR) Directorate
May 1999 - April 2002
\$174,000

Development of a Multimedia Course on the Geometry of Curves and Surfaces with Applications to Computer Aided Geometric Design

Co-Investigator with W. Gu and M. Moody
Mellon Foundation Small Grants Program
May 1997 - September 1997
\$10,350

Scientific Visualization in the Introductory Computer Science and Mathematics Curricula

Principal Investigator with co-investigators R. Bull, B. Keller, M. Moody, and W. Tam
Mellon Foundation Small Grants Program
January 1996 - February 1997
\$16,600

Deadlock-Free Fault Tolerant Routing in Wormhole-Routed Multicomputers

National Science Foundation RUI Grant
Computer-Communications Research (CCR) Directorate
March 1995 - April 1998
\$98,079

RECENT INVITED TALKS

Packing Multiple Knapsacks With a Knife

School of Mathematics and Statistics, University of South Australia, November 2007.

The Complexity of Games and Puzzles

Department of Computer Science, California State University Long Beach, March 2005.

Gossip, Rumors, and Multicast

Department of Computer Science, California State University San Bernardino, March 2004.

Teaching Tips and Tricks

Effective Teaching Program, California Institute of Technology, January 2004.

Multicasting in Heterogeneous Networks of Workstations

2002 Southern California Parallel Processing and Computer Architecture Workshop, University of California at Irvine, March 2002.

Supporting Multicast Communication in WDM Optical Networks

Department of Computer Science, University of California Riverside, December 2001

Gossip, Rumors, and Algorithms

Claremont Colleges Mathematics Colloquium, March 2001 and California State Univer-

sity Long Beach, September 2001

Multicast Algorithms for Heterogeneous Networks of Workstations

Department of Computer Systems Engineering, Ben Gurion University, Israel, December 1999

Efficient Multicast Communication in Wormhole-Routed Networks of Workstations

Department of Electrical Engineering, University of Southern California, April 1999

Parallel Computing and Worms

Department of Mathematics and Computer Science, Boise State University, January 1999

The Computational Sciences at HMC (with L. dePillis) and *Computer Graphics at HMC*
Project InterMath Meeting, Macalester College, June 1998

Multicast Routing in Networks of Workstations

Department of Electrical Engineering, California Institute of Technology, January 1998

Worms, Algorithms, and Parallel Computers

Claremont Colleges Mathematics Colloquium, October 1997

New Results in Fault Tolerant Wormhole Routing

Department of Computer Science, University of Oregon, March 1996

Fault Tolerant Wormhole Routing in the Mesh

Department of Electrical and Computer Engineering, University of California Irvine, June 1995

PROFESSIONAL ACTIVITIES

Editorial Board: Member of the Editorial Board of the IEEE Transactions on Computers (two terms, 2001-2005)

Program Committees: 2008 International Conference on Computer Communications and Networks, 2008 International Conference on Parallel Processing, 2006 International Conference on Communications and Networking in China, 2004 International Conference on High Performance Computing, 2004 International Conference on Parallel and Distributed Computing and Networks, 2003 International Conference on Parallel Processing, 2003 International Conference on Parallel and Distributed Computing and Systems, 2003 International Conference on High Performance Computing, 2002 International Conference on Computer Communications and Networks, 2002 International Conference on Parallel Processing, 2002 International Conference on Parallel and Distributed Computing and Systems, 2001 International Conference on Computer Communications and Networks, 2001 International Conference on Parallel and Distributed Computing and Systems, 2000

International Conference on Parallel Processing, 2000 International Conference on Parallel and Distributed Computing and Systems, 1995 IEEE International Workshop on Defect and Fault Tolerance in VLSI Systems

Grant and Advisory Panels: Panelist for the NSF CISE (Computer and Information Sciences and Engineering) Directorate, Arlington, Virginia, April 1998 and March 2000, Panelist for NSF workshop on "Next Generation Systems," Seattle, Washington, June 1999

Grant Reviews: NSF MIPS Division (Microelectronic Information Processing Systems)

Education Committees: 2002, 2003, 2004 CRA (Computing Research Association) Undergraduate Award Program Committee

TEACHING ACTIVITIES AT HARVEY MUDD

Courses Taught: Mathematics 55 (*Discrete Mathematics*), Mathematics 73 (*Linear Algebra*), Computer Science 6 (*Computer Problem Solving and Applications*), Computer Science 60 (*Principles of Computer Science*), Computer Science 140 (*Algorithms*, cross-listed as Mathematics 168), Computer Science 141 (*Advanced Topics in Algorithms*), Computer Science 142 (formerly *Theory of Computation* but now reorganized as *Complexity Theory*, cross-listed as Mathematics 167), Computer Science 155 (*Computer Graphics*)

Clinic Projects: Supervised 10 year-long clinic projects (undergraduate research and development projects sponsored by industrial partners)

Senior Theses: Supervised or co-supervised 16 senior theses in computer science and mathematics (11 from Harvey Mudd, 2 from Scripps, 2 from Pomona, and 1 from Claremont McKenna)

Summer Research Students: Supervised 25 summer research students (22 funded by NSF and 3 funded by HMC)

Ph.D. Dissertation Committees:

- Ms. Honge Wang, doctoral candidate in Electrical and Computer Engineering, University of California at Irvine, Fall 1999
- Mr. Raymond Moberly, doctoral candidate in Computational Science, Joint Doctoral Program of San Diego State University and Claremont Graduate University, 2005–present

COLLEGE SERVICE

Faculty Executive Committee: Three terms. 1997-1998, 1998-2000, 2001-2003

Reappointment, Promotion, and Tenure Committee: Two terms. 2003-2005, 2005-2008 (Chair, 2004-2005)

Claremont Colleges Committee on Religious Activity: 2001-2002

Faculty Ad Hoc Committee on Excellence: 2003 (Chair)

Watson Fellowship Selection Committee: 1995-2000, 2001-present (Chair 1998-1999)

Computing Committee: 1994-1995

Committee on Scholarly Standing: 1995-1996

Committee on Teaching and Learning: 1995-1997

Faculty Liaison to the Trustee Development Committee: 2004-present

Presentation Days Committee: 1994-1996 (Chair)

Bruce J. Nelson Distinguished Speaker Series: Organizer 2004-2005

Advisor, ACM Student Chapter: 2005-present

PUBLICATIONS

Italicized names indicate undergraduate student authors

Book

- [1] R. Libeskind-Hadas, N. Hasan, J. Cong, P. McKinley, and C. L. Liu. *Fault Covering Problems in Reconfigurable VLSI Systems*. Kluwer Academic Publishers, Boston, 1992.

Journal Papers

- [2] K. Benson, B. Birnbaum, E. Estolano-Molina, and R. Libeskind-Hadas, "Competitive Analysis of Online Traffic Grooming in WDM Rings," accepted for publication in *IEEE/ACM Transactions on Networking*.
- [3] I. Ferrel, E. Miller, A. Mettler, and R. Libeskind-Hadas, "Virtual Topologies for Multicasting with Multiple Originators in WDM Networks," *IEEE/ACM Transactions on Networking*, Vol. 14, No. 1, February 2006, pp. 183-190.
- [4] E. Miller, R. Libeskind-Hadas, D. Barnard, W. Chang, K. Dresner, W. Turner, and J. R. Hartline, "On the Complexity of Virtual Topology Design for Multicasting in WDM Trees with Tap-and-Continue and Multicast Capable Switches," *IEEE Journal on Selected Areas in Communications, Optical Communications and Networking Series*, Vol. 22, No. 9, November 2004, pp. 1601-1612.

- [5] J. R. Hartline, R. Libeskind-Hadas, K. Dresner, E. Drucker, and K. Ray, "Optimal Virtual Topologies for One-To-Many Communication in WDM Paths and Rings," *IEEE/ACM Transactions on Networking*, Vol. 12, No. 2, April 2004, pp. 375-383.
- [6] J. R. Hartline and R. Libeskind-Hadas, "The Computational Complexity of Motion Planning," *SIAM Review*, Vol. 45, No. 3, October 2003, pp. 543-557.
- [7] R. Libeskind-Hadas and R. Melhem, "Multicast Routing and Wavelength Assignment in Multi-Hop Optical Networks," *IEEE/ACM Transactions on Networking*, Vol. 10, Issue 5, October 2002, pp. 621-629.
- [8] R. Libeskind-Hadas, J. R. Hartline, P. Boothe, G. Rae, and J. Swisher, "On Multicast Algorithms for Heterogeneous Networks of Workstations," *Journal of Parallel and Distributed Computing*, (special issue on cluster and network-based computing), Vol. 61, No. 11, November 2001, pp. 1665-1679.
- [9] C. Jones and R. Libeskind-Hadas, "Matroids: The Theory and Practice of Greed," *The UMAP Journal*, Vol. 21, No. 2, Summer 2000, pp. 179-202.
- [10] B. Barden, J. Davis, R. Libeskind-Hadas, and W. Williams, "On Edge-Disjoint Spanning Trees in Hypercubes," *Information Processing Letters*, Vol. 70, Issue 1, April 16, 1999, pp. 13-16.
- [11] R. Libeskind-Hadas, "A Tight Lower Bound on the Number of Channels Required for Deadlock-Free Wormhole Routing," *IEEE Transactions on Computers*, Vol. 47, No. 10, October 1998, pp. 1158 -1160.
- [12] R. Libeskind-Hadas, "Sorting in Parallel," *The American Mathematical Monthly*, Vol. 105, No. 3, March 1998, pp. 238-245.
- [13] R. Libeskind-Hadas and E. Brandt, "Origin-Based Fault Tolerant Routing in the Mesh," *Future Generation Computer Systems*, Vol. 11, No. 6, October 1995, pp. 603-615.
- [14] R. Libeskind-Hadas, N. Shrivastava, R. G. Melhem, and C. L. Liu, "Optimal Re-configuration Algorithms for Real-Time Fault Tolerant Processor Arrays," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 6, No. 5, May 1995, pp. 498-510.
- [15] R. Libeskind-Hadas, "Approximation Algorithms: Good Solutions to Hard Problems," *The American Mathematical Monthly*, Vol. 102, No. 1, January 1995, pp. 57-61.
- [16] P. K. McKinley, N. Hasan, R. Libeskind-Hadas, and C. L. Liu, "Disjoint Covers in Replicated Heterogeneous Arrays," *SIAM Journal on Discrete Mathematics*, Vol. 4, No. 2, May 1991, pp. 281-292.

Refereed Conference Papers

- [17] J. Crouser, B. Rice, A. Simpson, and Ran Libeskind-Hadas, "On-line Distributed Traffic Grooming," accepted to appear in *Proceedings of the IEEE International Conference on Communications*, May 2008, Beijing, China.
- [18] Z. Dodds, R. Libeskind-Hadas, C. Alvarado, and G. Kuenning, "Evaluating Breadth-First CS 1 for Scientists," *Proceedings of SIGCSE 2008*, March 2008, Portland Oregon.
- [19] Z. Dodds, C. Alvarado, G. Kuenning, and R. Libeskind-Hadas, "Breadth-first CS 1 for Scientists: Curriculum and Assessment," *Proceedings of the 12th Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE)*, June 2007, Dundee Scotland.
- [20] D. Buchfuhrer, T. Carnes, B. Tagiku, L. Celis, and R. Libeskind-Hadas, "Traffic Grooming for Single-Source Multicast Communication in WDM Rings," *Proceedings of the IEEE International Conference on Communications*, May 2005, Seoul, South Korea.
- [21] R. Libeskind-Hadas, J. Hartline, K. Dresner, E. Drucker, and K. Ray, "Multicast Virtual Topologies in WDM Paths and Rings with Splitting Loss," *Proceedings of the Eleventh IEEE International Conference on Computer Communications and Networks*, October 2002, Miami, Florida, pp. 318-321.
- [22] R. Libeskind-Hadas and R. Melhem, "Multicast Routing and Wavelength Assignment in Multi-Hop Optical Networks," *Proceedings IEEE International Conference on Networking*, July 2001, Colmar, France. Available as Springer-Verlag Lecture Notes in Computer Science, Volume 2093, Pascal Lorenz (Editor), pp. 508-519.
- [23] R. Libeskind-Hadas and R. Melhem, "Multicast Communication in Circuit-Switched Optical Networks," *Proceedings of the International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA 2001)*, June 2001, Las Vegas, Nevada, pp. 1862-1868. (Invited Paper)
- [24] R. Libeskind-Hadas, "Efficient Collective Communication in WDM Networks with a Power Budget," *Proceedings IEEE Ninth International Conference on Computer Communications and Networks*, October 2000, Las Vegas, Nevada, pp. 612-616.
- [25] R. Libeskind-Hadas and J. Hartline, "Efficient Multicast in Heterogeneous Networks of Workstations," *Proceedings of the International Conference on Parallel Processing Workshop on Network-Based Computing*, August 2000, Toronto, Canada, pp. 403-410.
- [26] R. Libeskind-Hadas, D. Mazzoni, and R. Rajagopalan, "Optimal Contention-Free Unicast-Based Multicasting in Switch-Based Networks of Workstations," *Proceedings of the Merged 12th International Parallel Processing Symposium and the 9th Symposium on Parallel and Distributed Processing*, April 1998, Orlando, Florida, pp. 358-364.

- [27] R. Libeskind-Hadas, *D. Mazzoni*, and *R. Rajagopalan*, "Tree-Based Multicasting in Wormhole-Routed Irregular Topologies," *Proceedings of the Merged 12th International Parallel Processing Symposium and the 9th Symposium on Parallel and Distributed Processing*, April 1998, Orlando, Florida, pp. 244-249.
- [28] R. Libeskind-Hadas, *T. Hehre*, *A. Hutchings*, *M. Reyes*, and *K. Watkins*, "Adaptive Multicast Routing in Wormhole Networks," *Proceedings of the Ninth IASTED International Conference on Parallel and Distributed Computing and Systems*, October 1997, Washington D.C, pp. 513-522.
- [29] R. Libeskind-Hadas, *K. Watkins*, and *T. Hehre*, "Fault Tolerant Multicast Routing in the Mesh with No Virtual Channels," *Proceedings of the 1996 International Symposium on High-Performance Computer Architecture (HPCA '96)*, February 1996, San Jose, California, pp. 180-190.
- [30] R. Libeskind-Hadas, "A Tight Bound on the Number of Channel Faults in Wormhole-Routed Multicomputers," *Proceedings of the 1995 Pacific Rim International Symposium on Fault Tolerant Systems (PRFTS '95)*, December 1995, Newport Beach, California, pp. 14-18.
- [31] R. Libeskind-Hadas and *E. Brandt*, "Origin-Based Fault Tolerant Routing in the Mesh," *Proceedings of the 1995 International Symposium on High-Performance Computer Architecture (HPCA '95)*, January 1995, Raleigh-Durham, North Carolina, pp. 102-111.
- [32] R. Libeskind-Hadas, "Distributed Algorithms for the Reconfiguration of Fault Tolerant Multicomputers," *Proceedings of the Seventh International Conference on Parallel and Distributed Computing Systems (PDCS '94)*, October 1994, Las Vegas, Nevada, pp. 490-496.
- [33] R. Libeskind-Hadas and *C. L. Liu*, "Reconfigurable Multipipelines with Minimum Interprocessor Delay," *Proceedings of the Fifth International Conference on Parallel and Distributed Computing and Systems (PDCS '92)*, October 1992, Pittsburgh, Pennsylvania, pp. 377-382.
- [34] R. Libeskind-Hadas, *N. Shrivastava*, *R. G. Melhem*, and *C. L. Liu*, "Efficient Bi-Level Reconfiguration Algorithms for Fault Tolerant Arrays," *Proceedings of the 1992 IEEE International Workshop on Defect and Fault Tolerance in VLSI Systems*, November 1992, Dallas, Texas.
- [35] R. Libeskind-Hadas and *C. L. Liu*, "Fast Search Algorithms for Reconfiguration Problems," *Proceedings of the 1991 IEEE International Workshop on Defect and Fault Tolerance in VLSI Systems*, November 1991, Hidden Valley, Pennsylvania, pp. 260-273.
- [36] R. Libeskind-Hadas and *C. L. Liu*, "Solutions to the Module Orientation and Rotation Problems by Neural Computation Networks," *Proceedings 26th Design Automation Conference (DAC)*, Las Vegas, NV, June 1989, pp. 400-405.

- [37] R. Libeskind-Hadas and C. L. Liu, "Using Neural Networks to Solve VLSI Design Problems," *Proceedings 1989 American Control Conference*, Pittsburgh, PA, June 1989.
- [38] R. Libeskind-Hadas and P. Maragos, "Application of Iterated Function Systems and Skeletonization to Synthesis of Fractal Images," *Proceedings SPIE Visual Communications and Image Processing II*, Cambridge, MA, October 1987, pp. 276-284.

Brief Notes, Book Chapters, and Other Publications

- [39] R. Libeskind-Hadas, "Proof Without Words: The Pigeonhole Principle," *Mathematics Magazine*, Vol. 75, No. 1, November 2001, page 32.
- [40] Book Chapter entitled "The Internet, the Web, and Logic" in the textbook *For All Practical Purposes, Sixth Edition* published by W. H. Freeman and Company, 2002.